



CONTENTS

Scope of This Manual . . . . . 3

Unpacking and Inspection . . . . . 3

Safety . . . . . 3

    Terminology and Symbols . . . . . 3

    Considerations . . . . . 3

Introduction. . . . . 4

Installation. . . . . 4

Operating The Monitor. . . . . 5

    Buttons . . . . . 5

    Modes. . . . . 5

Programming . . . . . 6

    Programming Mode. . . . . 6

    Run Mode . . . . . 7

Additional Scaling Parameters . . . . . 8

    Flow 4 mA Setting . . . . . 8

    Flow 20 mA Setting . . . . . 8

    4...20 mA Calibration . . . . . 8

    4...20 mA Test . . . . . 8

Battery Replacement . . . . . 9

Additional Input Options . . . . . 9

Specifications. . . . . 10

Dimensions . . . . . 11

Troubleshooting Guide. . . . . 11

Part Numbering . . . . . 11

Default K-factor Values . . . . . 12

## SCOPE OF THIS MANUAL

This manual is intended to help you get the B2800 flow monitor up and running quickly.

### IMPORTANT

*Read this manual carefully before attempting any installation or operation. Keep the manual accessible for future reference.*

## UNPACKING AND INSPECTION

Upon opening the shipping container, visually inspect the product and applicable accessories for any physical damage such as scratches, loose or broken parts, or any other sign of damage that may have occurred during shipment.

**NOTE:** If damage is found, request an inspection by the carrier's agent within 48 hours of delivery and file a claim with the carrier. A claim for equipment damage in transit is the sole responsibility of the purchaser.

## SAFETY

### Terminology and Symbols



Indicates a hazardous situation, which, if not avoided, is estimated to be capable of causing death or serious personal injury.



Indicates a hazardous situation, which, if not avoided, could result in severe personal injury or death.



Indicates a hazardous situation, which, if not avoided, is estimated to be capable of causing minor or moderate personal injury or damage to property.

### Considerations

The installation of the B2800 monitor must comply with all applicable federal, state, and local rules, regulations, and codes.



**EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.**



**RISQUE D'EXPLOSION - LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CEMATÉRIEL INACCÉPTABLE POUR LES EMPLACEMENTS DE CLASSE I, DIVISION 2.**



**DO NOT CONNECT OR DISCONNECT EITHER POWER OR OUTPUTS UNLESS THE AREA IS KNOWN TO BE NON-HAZARDOUS.**



**RISQUE D'EXPLOSION. NE PAS DÉBRANCHER TANT QUE LE CIRCUIT EST SOUSTENSION, À MOINS QU'IL NE S'AGISSE D'UN EMPLACEMENT NON DANGEREUX.**

### IMPORTANT

*Not following instructions properly may impair safety of equipment and/or personnel.*

## INTRODUCTION

The B2800 flow monitor is a state-of-the-art digital signal processing flow monitor, designed to provide exceptional flexibility at an affordable price. Though it is designed for use with Blancett flow meters, this display can be used with almost any flow meter producing a low amplitude AC output or contact closure signal.

This flow monitor is capable of accepting a low level frequency input for calculating flow rate and total. These calculations can then be displayed in a variety of units of measurement. All B2800 Flow monitors come pre-programmed from the factory if it is ordered with a Blancett flow meter. If required, however, it can easily be reconfigured in the field. The monitor's large eight digit by 0.50 in. (12.7 mm) numeric liquid crystal display makes extended range viewing practical. The second eight digit by 0.25 in. (6.35 mm) alphanumeric display provides for selectable units viewing in run mode and prompts for variables in program mode. The display can show rate, total or alternate between both rate and total.



Figure 1: B2800 Panel mount flow monitor

## INSTALLATION

1. Cut a 3.6 in.  $\times$  3.6 in. (9.144 cm  $\times$  9.144 cm) square opening in the panel. See *Figure 2*.
2. Disconnect the battery from the main board terminal.
3. Remove the large battery mounting plate by removing the four Phillips head screws from the main assembly standoffs.
4. Mount the main assembly through the panel opening and temporarily hold in place (tape will work).
5. Attach the signal wires to the appropriate terminal blocks.
6. Reattach the large battery mounting plate with the four Phillips head screws.
7. Secure the assembly to the panel with the four outer screws.

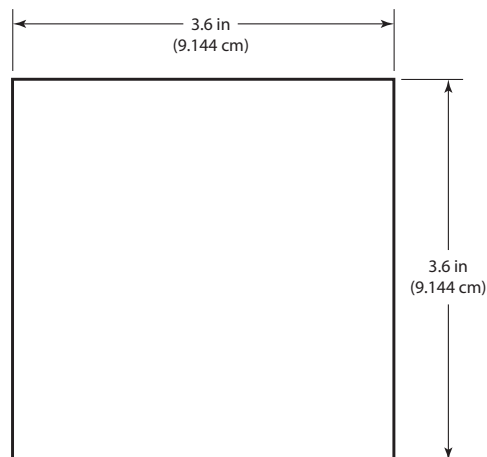


Figure 2: Panel cutout

## OPERATING THE MONITOR

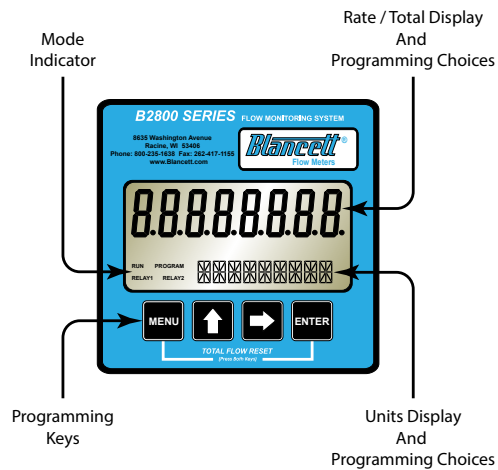


Figure 3: B2800 panel mount flow monitor

### Buttons

<b>MENU</b>	Switches to <i>PROGRAM</i> mode
<b>UP</b>	Scrolls forward through the parameter options and increments numeric variables
<b>RIGHT</b>	Scrolls backward through the parameter options and moves the active digit to the right
<b>ENTER</b>	Saves programming information, advances to the next programming parameter, and used in the reset process

### Modes

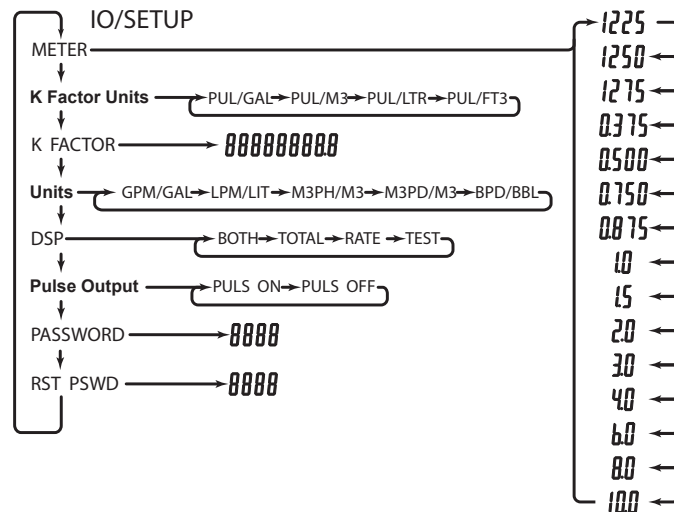
<b>RUN</b>	Normal operating mode
<b>PROGRAM</b>	Used to program parameters in the display

If your monitor was ordered with a Blancett flow meter, the two components ship from the factory calibrated as a set. If the monitor is a replacement, the turbine's K-factor has changed or the monitor is being used with some other pulse generating device, the monitor must be programmed.

## PROGRAMMING

Each turbine flow meter is shipped with either a K-factor value or frequency data. If frequency data is provided, the data must be converted to a K-factor before programming the monitor. K-factor information, when supplied, can usually be found on the neck of the flow meter or stamped on the flow meter body. The K-factor represents the number of pulses per unit of volume. The K-factor is needed to program the monitor readout.

### Programming Mode



### Enter Program Mode

Press **MENU** to enter the programming mode. The mode indicator changes from *RUN* to *PROGRAM*.

### Select Meter Size

At the *METER* prompt, press **UP** or **RIGHT** to scroll to the bore size of your meter. Press **ENTER** to save and advance to the *K-factor Units* parameter.

**NOTE:** The meter connection size and the bore size are different. For example, many of the one inch NPT turbines have bore sizes that range from 3/8...1 in. Be sure to use the correct bore size or the meter will report incorrect flows and totals.

### Enter The K-Factor Unit

Press **UP** or **RIGHT** to scroll to the K-factor unit of the meter. Enter the unit that the meter was calibrated in.

#### Example

If the meter was calibrated in US gallons, use *PUL/GAL*.

Press **ENTER** to save the K-factor unit and advance to the *K FACTOR* parameter.

**NOTE:** Unless otherwise specified, Blancett turbine flow meters are supplied with K-factors measured in pulses per gallon (*PUL/GAL*) which will automatically convert to your desired units of measure.

### Enter The Meter's K-Factor

**NOTE:** The K-factor supplied with the meter or calculated from calibration data is needed to set this parameter.

To change the K-factor value, press **RIGHT** to select the digit that you wish to change. Press **UP** to increment the digit until it matches the meter's K-factor. Repeat this process until all K-factor digits have been entered. Press **ENTER** to save the K-factor and advance to *RATE/TOTAL*.

## Select the Units of Measure

The monitor is programmed with five common rate/total unit options. The monitor shows the rate/total unit that the display is currently set for. If the current selection is correct, press **ENTER** once to advance to the *DISPLAY FUNCTION* parameter. To change the unit, press **UP** or **RIGHT** to scroll to the correct rate unit. Press **ENTER** to save and advance to the *DISPLAY FUNCTION* parameter.

Selection	Rate	Total
GPM/GAL	Gallons per minute	Gallons
LPM/LIT	Liters per minute	Liters
M3PH/M3	Cubic meters per hour	Cubic meters
M3PD/M3	Cubic meters per day	Cubic meters
BPD/BBL	Oil barrels per day	Oil barrels

## Select the Display Function

The monitor displays *RATE*, *TOTAL*, alternates between *BOTH* rate and total or *TEST*. If the current selection is correct, press **ENTER** to advance to the next parameter. To change to an alternate display mode, press **UP** or **RIGHT** to scroll to the correct display mode and press **ENTER** to save and advance to the *TOTALIZER PULSE OUTPUT* parameter.

The *TEST* function acts like a frequency counter and displays the raw input frequency being supplied to the frequency input terminals. This is very useful when troubleshooting flow problems.

## Totalizer Pulse Output

The pulse output parameter can be enabled or disabled. When enabled this output generates 20 mS duration pulse for every time the least significant digit of the totalizer increments. The amplitude of the pulse is dependent on the voltage level of the supply connected to the pulse output and is limited to a maximum 30V DC. Press **UP** or **RIGHT** to scroll to *ON* or *OFF*. Press **ENTER** to save and advance to the *PASSWORD* parameter.

## Password

The *PASSWORD* setting restricts access to *PROGRAM* mode. Initially, the password is set to all zeros and any user can modify the parameter settings in *PROGRAM* mode. To change the password, enter any four digit code. Press **UP** to increment the digit, and **RIGHT** to advance to the next digit. Press **ENTER** to store the password and advance to *RST PSWD*. The new password is now required to enter *PROGRAM* mode. With this password set, any user is able to reset the stored totals on the monitor.

## Reset Password

The *RST PSWD* restricts resetting the totals on the monitor. The *PASSWORD* must also be set to restrict the total reset. Initially, the password is set to all zeros and any user can reset the stored totals on the monitor. To change the password, enter any four digit code. Press **UP** to increment the digit, and **RIGHT** to advance to the next digit. After entering all digits, press **ENTER** to store the password and return to *RUN* mode. The reset password is now required to reset the totals on the monitor.

## Run Mode

### Reset Total

To reset the monitor total display, in *RUN* mode press **MENU** and **ENTER** simultaneously. If the *RST PSWD* has been set to something other than the default, you must enter the new password before the monitor will reset. The monitor flashes *TOTAL RST* and returns to *RUN* mode at the conclusion of the reset procedure.

### Store Total

The current total can be manually stored in the monitor's flash memory. Use this feature prior to replacing the battery. Press and hold **ENTER** for 2 seconds. The display responds with a flashing *TOTALSVD* and then returns to *RUN* mode.

### Automatic Store Total

The monitor is equipped with a store total feature that works automatically, saving the current total to flash memory. The frequency of saves depends on the power supply option chosen.

- Battery Powered: Once per hour and just before a low battery condition turns the unit off.
- Loop Powered: Once every ten minutes.

## ADDITIONAL SCALING PARAMETERS

**NOTE:** The programming instructions below are only available for loop powered units. Battery powered units do not include these programming parameters.

### Flow 4 mA Setting

Zero is the default flow rate at the 4 mA setting. If the current selection is correct, press **ENTER** to advance to the *Flow 20 mA* parameter. To change the setting, press **UP** to increment the flashing digit and press **RIGHT** to move to the next digit. Press **ENTER** to save and advance to the *Flow 20 mA* parameter.

### Flow 20 mA Setting

The turbine meter's maximum flow rate is the default value for the 20 mA setting. If the current selection is correct, press **ENTER** to advance to the *4...20 mA Calibration* parameter. To change the setting, press **UP** to increment the flashing digit and press **RIGHT** to move to the next digit. Press **ENTER** to save and advance to the *4...20 mA Calibration* parameter.

### 4...20 mA Calibration

The *4...20 mA Calibration* parameter is the fine adjustment of the 4...20 mA output. The 4 mA setting is typically between 35...50. To set the 4 mA value, connect an ammeter in series with the loop power supply. At the *4MA OUT* prompt, press **UP** to increment and **RIGHT** to decrement the 4 mA value to until a steady 4 mA reading is reached on the ammeter. Press **ENTER** to lock in this value and advance to *20MA OUT*. The 20 mA adjustment is performed using the same procedure as the 4 mA adjustment.

### 4...20 mA Test

The monitor contains a diagnostic routine that allows the simulation of mA values between 4...20 to check output tracking. At the *4-20TEST* prompt press **UP** to increment the simulated mA output or **RIGHT** to decrement the value in increments of 1 mA. The ammeter should track the simulated mA output. If a 4...20 mA test is not necessary, press **ENTER** once to escape the testing at any time.

**NOTE:** If you ordered the B2800 flow monitor with a Blancett turbine flow meter, the 4...20 mA was programmed and factory calibrated.

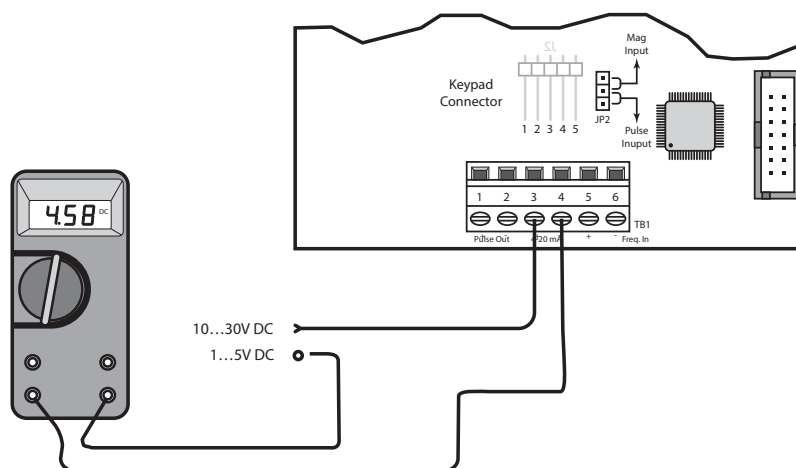


Figure 4: Typical ammeter connection

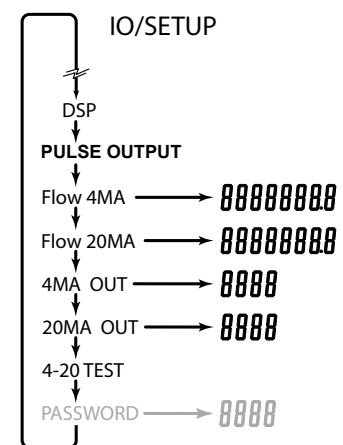


Figure 5: 4...20 mA programming menu



## BATTERY REPLACEMENT

Battery powered monitors use a single 1.5V, D size, alkaline battery. When replacement is needed, use a clean, fresh battery to ensure continued trouble-free operation. It is recommended that the total be saved to memory before the battery is removed.

1. Carefully unscrew the enclosure cover to access the circuit board.
2. Remove the four screws securing the circuit board to the enclosure.
3. Lay the circuit board to the side being careful not to pull any wires from their connections.
4. Clip the battery retaining wire/strap and remove the battery.
5. Replace the battery, being sure to observe the proper polarity and install a new retaining strap or wire.
6. Reassemble the monitor, reversing the disassembly process.

## ADDITIONAL INPUT OPTIONS

The B2800 flow monitor is capable of receiving magnetic pickup input (small signal sine wave) or a contact closure input (pulse). Since most Blancett turbine flow meters utilize a magnetic pickup, the B2800 flow monitor is shipped configured for magnetic pickup input. To change to a contact closure input, remove JP2 from the bottom two pins and jumper them to the top two pins. See *Figure 7*.

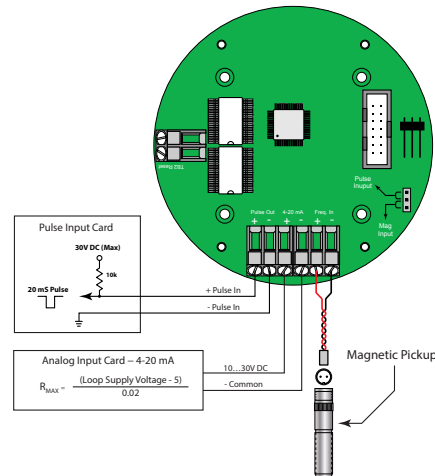


Figure 6: Wiring diagram

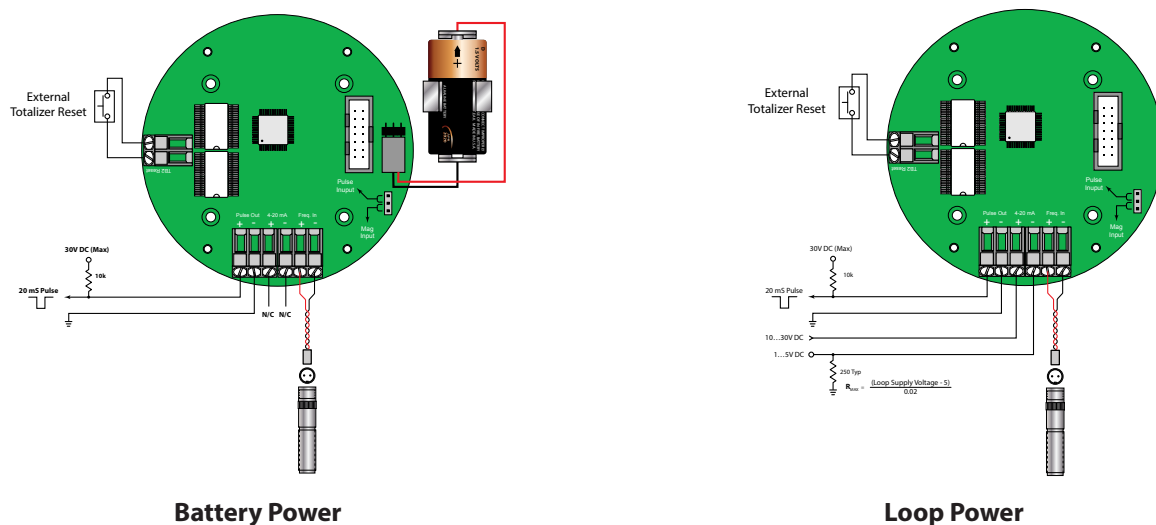
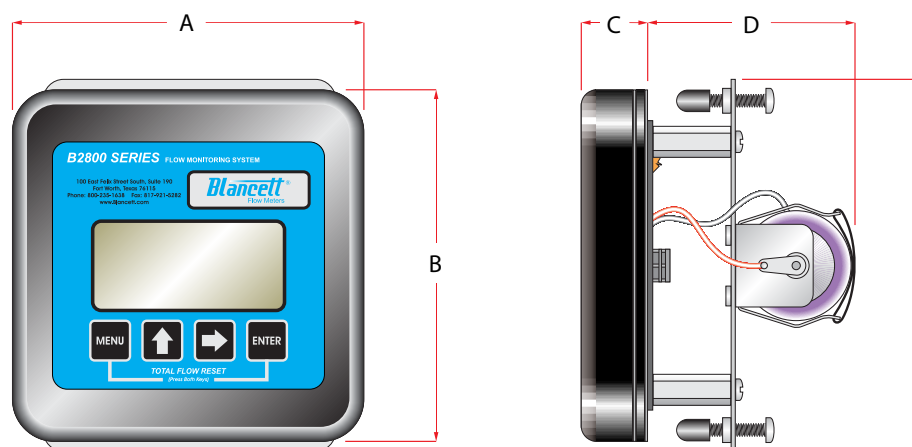


Figure 7: Circuit board layouts

## SPECIFICATIONS

<b>Power Supply Options</b>	
Battery Powered	One D size, 1.5V alkaline battery
Loop Powered	Optional 4...20 mA loop power
<b>Alphanumeric Rate and Total Display</b>	
Eight digit, 0.50 inch high numeric display	
Eight character, 0.25 inch high alphanumeric display	
Fixed or toggle modes of operation for flow rate and totalizer display	
<b>Accuracy</b>	±0.1%
<b>Temperature Drift</b>	50 ppm / ° C (maximum)
<b>Mounting Style</b>	Panel Mount (3.6 inch × 3.6 inch Opening). NEMA 4 (front only)
<b>Environmental</b>	
Operating Temperature	−22...158° F (−30...70° C)
Humidity	0...90% Non-condensing
<b>Inputs</b>	
Type	Magnetic pickup input
Frequency Range	0...3500 Hz
Trigger Sensitivity	30 mV p-p
Over Voltage Protected	±30V DC
<b>Outputs</b>	
Type	Opto-isolated open collector transistor
Maximum Voltage	30V DC
Pulse width	20 mS/Max rate 20 Hz
Current (ON state)	0.9V drop @ 5.0 mA or 0.7V drop @ 0.1 mA
Optional	4...20 mA output

## DIMENSIONS

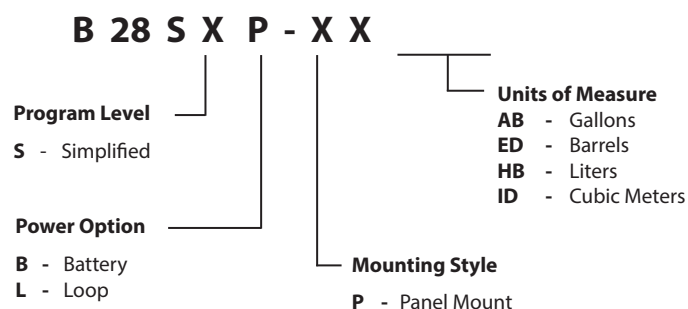


A	B	C	D	E
4.25 in. (107.9 mm)	4.25 in. (107.9 mm)	0.75 in. (19.0 mm)	2.50 in. (63.5 mm)	4.54 in. (115.3 mm)

## TROUBLESHOOTING GUIDE

Issue	Remedy
No LCD display	<ul style="list-style-type: none"> <li>Check battery voltage. Should be 1.5V DC. Replace if low or bad.</li> </ul>
No rate or total displayed	<ul style="list-style-type: none"> <li>Check connection from meter pickup to display input terminals.</li> <li>Check turbine meter rotor for debris. Rotor should spin freely.</li> <li>Check programming of flow monitor.</li> </ul>
Flow rate display interprets reading constantly	<ul style="list-style-type: none"> <li>This is usually an indication of external noise. Keep all AC wires separate from DC wires.</li> <li>Check for large motors close to the meter pickup.</li> <li>Check for radio antenna in close proximity.</li> <li>Try disconnecting the pickup from the monitor pig tail. This should stop the noise.</li> </ul>
Flow rate indicator bounces	<ul style="list-style-type: none"> <li>This usually indicates a weak signal. Replace pickup and/or check all connections.</li> <li>Check K-factor.</li> </ul>

## PART NUMBERING



DEFAULT K-FACTOR VALUES

Meter Size	Default K-factor	Lower Limit	Upper Limit
3/8 in. (9.53 mm)	20,000	16,000	24,000
1/2 in. (12.7 mm)	13,000	10,400	15,600
3/4 in. (19.05 mm)	2750	2200	3300
7/8 in. (22.23 mm)	2686	2148	3223
1 in. (25.4 mm)	870.0	696.0	1044
1-1/2 in. (38.1 mm)	330.0	264.0	396.0
2 in. (50.8 mm)	52.0	41.6	62.0
3 in. (76.2 mm)	57.0	45.6	68.0
4 in. (101.6 mm)	29.0	23.2	35.0
6 in. (152.4 mm)	7.0	5.6	8.0
8 in. (203.2 mm)	3.0	2.4	4.0
10 in. (254 mm)	1.6	1.3	2.0

Control. Manage. Optimize.

BLANCETT is a registered trademark of Badger Meter, Inc. Other trademarks appearing in this document are the property of their respective entities. Due to continuous research, product improvements and enhancements, Badger Meter reserves the right to change product or system specifications without notice, except to the extent an outstanding contractual obligation exists. © 2015 Badger Meter, Inc. All rights reserved.

www.badgermeter.com